SFF specifications are available at http://www.snia.org/sff/specifications
or ftp://ftp.seagate.com/sff

This specification was developed by the SFF Committee prior to it becoming the SFF TA (Technology Affiliate) TWG (Technical Working Group) of SNIA (Storage Networking Industry Association).

The information below should be used instead of the equivalent herein.

POINTS OF CONTACT:

Chairman SFF TA TWG
Email: SFF-Chair@snia.org

If you are interested in participating in the activities of the SFF TWG, the membership application can be found at:
http://www.snia.org/sff/join

The complete list of SFF Specifications which have been completed or are currently being worked on can be found at:
http://www.snia.org/sff/specifications/SFF-8000.TXT

The operations which complement the SNIA's TWG Policies & Procedures to guide the SFF TWG can be found at:
http://www.snia.org/sff/specifications/SFF-8032.PDF

Suggestions for improvement of this specification will be welcome, they should be submitted to:
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SFF Committee documentation may be purchased (see 2.3).
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SFF Committee

SFF-8424 Specification for

HSSDC-2 Dual Row Shielded Connections

Rev 0.5 January 14, 2004

Secretariat: SFF Committee

Abstract: This specification defines the physical interfaces and performance requirements for HSSDC-2 (High Speed Serial Data Connector-2) Dual Row Connectors and retention schemes to be used for Fibre Channel, Infiniband, SAS, and other duplex serial copper applications. Other uses of this general purpose connection system are also possible. These 14 position HSSDC-2 Dual Row Connectors are based on 1.25mm (0.05") ribbon style technology.

This document provides a common specification for systems manufacturers, system integrators, and suppliers of magnetic disk drives. This is an internal working document of the SFF Committee, an industry ad hoc group.

This document is made available for public review, and written comments are solicited from readers. Comments received by the members will be considered for inclusion in future revisions of this document.

The description of a connector in this document does not assure that the specific component is actually available from connector suppliers. If such a connector is supplied it must comply with this specification to achieve interoperability between suppliers.

Support: This document is supported by the identified member companies of the SFF Committee.

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EXPRESSION OF SUPPORT BY MANUFACTURERS

The following member companies of the SFF Committee voted in favor of this industry specification.

Adaptec
ENDL
FCI/Berg
Hewlett Packard
Intel
Madison Cable
Molex
Nexans
Sun Microsystems
Toshiba America
Tyco AMP

The following SFF member companies voted no on the technical content of this industry specification.

Amphenol
Brocade
Xyratex

The following member companies of the SFF Committee voted to abstain on this industry specification.

Dell
Fiberxon
Foxconn Int'l
Fujitsu Compnts
Fujitsu CPA
Hitachi GST
IBM
Maxtor
Micrel
Seagate
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Vitesse Semi

The user's attention is called to the possibility that implementation to this Specification may require use of an invention covered by patent rights. By distribution of this Specification, no position is taken with respect to the validity of this claim or of any patent rights in connection therewith. The patent holder has filed a statement of willingness to grant a license under these rights on reasonable and non-discriminatory terms and conditions to applicants desiring to obtain such a license.

If you are not a member of the SFF Committee, but you are interested in participating, the following principles have been reprinted here for your information.

PRINCIPLES OF THE SFF COMMITTEE

The SFF Committee is an ad hoc group formed to address storage industry needs in a prompt manner. When formed in 1990, the original goals were limited to defining de facto mechanical envelopes within which disk drives can be developed to fit compact computer and other small products.

Adopting a common industry size simplifies the integration of small drives (2 1/2" or less) into such systems. Board-board connectors carrying power and signals, and their position relative to the envelope are critical parameters in a product that has no cables to provide packaging leeway for the integrator.

In November 1992, the SFF Committee objectives were broadened to encompass other areas which needed similar attention, such as pinouts for interface applications, and form factor issues on larger disk drives. SFF is a forum for resolving industry issues that are either not addressed by the standards process or need an immediate solution.

Specifications created by the SFF Committee are expected to be submitted to bodies such as EIA (Electronic Industries Association) or an ASC (Accredited Standards Committee). They may be accepted for separate standards, or incorporated into other standards activities.

The principles of operation for the SFF Committee are not unlike those of an accredited standards committee. There are 3 levels of participation:

- Attending the meetings is open to all, but taking part in discussions is limited to member companies, or those invited by member companies
- The minutes and copies of material which are discussed during meetings are distributed only to those who sign up to receive documentation.
- The individuals who represent member companies of the SFF Committee receive documentation and vote on issues that arise. Votes are not taken during meetings, only guidance on directions. All voting is by letter ballot, which ensures all members an equal opportunity to be heard.

Material presented at SFF Committee meetings becomes public domain. There are no restrictions on the open mailing of material presented at committee meetings. In order to reduce disagreements and misunderstandings, copies must be provided for all agenda items that are discussed. Copies of the material presented, or revisions if completed in time, are included in the documentation mailings.

The sites for SFF Committee meetings rotate based on which member companies volunteer to host the meetings. Meetings have typically been held during the ASC T10 weeks.

The funds received from the annual membership fees are placed in escrow, and are used to reimburse ENDL for the services to manage the SFF Committee.

If you are not receiving the documentation of SFF Committee activities or are interested in becoming a member, the following signup information is reprinted here for your information.

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Meeting documentation contains:
- Minutes for the current meeting cycle.
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Each electronic mailing obsoletes the previous mailing of that year e.g. July replaces May. To build a complete set of archives of all SFF documentation, retain the last SFF CD_Access mailing of each year.

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Foreword

When 2 1/2" diameter disk drives were introduced, there was no commonality on external dimensions e.g. physical size, mounting locations, connector type, connector location, between vendors.

The first use of these disk drives was in specific applications such as laptop portable computers in which space was at a premium and time to market with the latest machine was an important factor. System integrators worked individually with vendors to develop the packaging. The result was wide diversity, and with space being such a major consideration in packaging, it was not possible to replace one vendor's drive with a competitive product.

The desire to reduce disk drive sizes to even smaller dimensions such as 1.8" and 1.3" made it likely that devices would become even more constrained in dimensions because of a possibility that such small devices could be inserted into a socket, not unlike the method of retaining semiconductor devices.

The problems faced by integrators, device suppliers, and component suppliers led to the formation of an industry ad hoc group to address the marketing and engineering considerations of the emerging new technology in disk drives. After two informal gatherings on the subject in the summer of 1990, the SFF Committee held its first meeting in August.

During the development of the form factor definitions, other activities were suggested because participants in the SFF Committee faced problems other than the physical form factors of disk drives. In November 1992, the members approved an expansion in charter to address any issues of general interest and concern to the storage industry. The SFF Committee became a forum for resolving industry issues that are either not addressed by the standards process or need an immediate solution.

At the same time, the principle was adopted of restricting the scope of an SFF project to a narrow area, so that the majority of specifications would be small and the projects could be completed in a rapid timeframe. If proposals are made by a number of contributors, the participating members select the best concepts and uses them to develop specifications which address specific issues in emerging storage markets.

Those companies which have agreed to support a specification are identified in the first pages of each SFF Specification. Industry consensus is not an essential requirement to publish an SFF Specification because it is recognized that in an emerging product area, there is room for more than one approach. By making the documentation on competing proposals available, an integrator can examine the alternatives available and select the product that is felt to be most suitable.

Suggestions for improvement of this specification will be welcome. They should be sent to the SFF Committee, 14426 Black Walnut Ct, Saratoga, CA 95070.

The development work on this specification was done by the SFF Committee, an industry group. The membership of the committee since its formation in 1990 has included a mix of companies which are leaders across the industry.

SFF Committee --

HSSDC-2 Dual Row Shielded Connections

1. Scope

This specification defines the terminology and physical requirements for shielded HSSDC-2 (High Speed Serial Data Connector) Dual Row connections, complete connectors, and the immediate electrical neighborhood of the connector proper that also influences the behavior of the connector. There is a single mating interface for all versions. The Dual Row connector is intermatable with the single row version specified in SFF-8420.

The HSSDC-2 single row connector style is specified in Fibre Channel, InfiniBand, and SAS and may be suitable for use with other high speed serial interface standards. This specification incorporates the contact position numbering for the upper/single row version (SFF-8420) along with the numbering for the lower row. These are all external shielded systems that require inter enclosure connections. These standards only specify the mating interface and have no specific performance requirements. This specification defines such requirements.

The mating sides (including retention) are compatible for all versions of the complete connector and the termination side is specified for a variety of practically important schemes.

The HSSDC-2 system was designed to satisfy the needs for gigabit serial data transmissions in a nominal 100ohm differential balanced copper link. The connector shield mating interface provides an EMI-tight (Electro Magnetic Interference) seal. Design goals were minimization of crosstalk, minimum transmission line impedance discontinuity across the connector, and management of EMI (caused by the connector or its mating interfaces).

The transmission line impedance of the connector itself (not including the termination interface to the wire or board) matches the electrical media within the tolerances allowed for the media. This connection scheme may be used in multiple places within a cabling environment. Though optimized for a 100ohm environment this connector will function acceptably at other impedance levels (to be optimized on a case by case basis).

The retention scheme consists of a single press-to-release catch. The look and feel of the HSSDC-2 family is suited to advanced high speed transmission applications (e.g. panel space requirements are less than many alternative connectors).

The physically robust design (e.g. no pins to bend) and relatively small size enable the HSSDC-2 Dual Row to be usable in all applications from notebooks to data centers. The connector is of a straightforward construction that does not rely on advanced materials or processes.

This specification defines the requirements on the mating and termination sides of the connectors to enable functional multiple sourcing of the complete connectors. The construction of the connectors between the mating and termination sides is not defined by this specification.

The connectors specified are fully shielded at the mating interface with provision for connecting shields together and for terminating shields, therefore specifications are included for the backshell-to-connector interfaces. Fibre Channel

and Infiniband standards presently incorporate requirements on the characteristic impedance and ability to transmit Gigabaud signals for cable assemblies and backplanes. As the HSSDC-2 Dual Row connector system may form part of this interconnect it is also subject to these requirements.

The high speed electrical performance requirements for the connector and its electrical neighborhood are specified in SFF-8410 which is hereby incorporated by reference into this document. These requirements include operation at 1 Gigabit/s and higher rates.

1.1 Description of Clauses

Clause 1 contains the Scope and Purpose.

Clause 2 contains Referenced and Related Standards and SFF Specifications.

Clause 3 contains the list of Figures and Tables

Clause 4 contains the General Description

Clause 5 contains the Definitions and Conventions

Clause 6 defines the Connector Descriptions and Dimensions.

2. References

The SFF Committee activities support the requirements of the storage industry, and it is involved with several standards.

2.1 Industry Documents

The following interface standards are relevant to this Specification.

- X3.230-1994 FC-PH Fibre Channel Physical Interface
- X3.297-199x FC-PH-2 Fibre Channel Physical Interface -2
- X3.303-199x FC-PH-3 Fibre Channel Physical Interface -3
- INCITS 1306 Fibre Channel Physical Interface
- IEEE 802.3z Gigabit Task Force
- InfiniBand IBTA Spec
- T10-1562 SAS (Serial Attached SCSI)
- T13-D1532 SATA (Serial ATA)

2.2 SFF Specifications

There are several projects active within the SFF Committee. At the date of printing document numbers had been assigned to the following projects. The status of Specifications is dependent on committee activities.

F = Forwarded	The document has been approved by the members for forwarding to a formal standards body.
P = Published	The document has been balloted by members and is available as a published SFF Specification.
A = Approved	The document has been approved by ballot of the members and is in preparation as an SFF Specification.
C = Canceled	The project was canceled, and no Specification was Published.
D = Development	The document is under development at SFF.
E = Expired	The document has been published as an SFF

Specification, and the members voted against re-publishing it when it came up for annual review.

e = electronic Used as a suffix to indicate an SFF Specification which has Expired but is still available in electronic form from SFF e.g. a specification has been incorporated into a draft or published standard which is only available in hard copy.

i = Information The document has no SFF project activity in progress, but it defines features in developing industry standards. The document was provided by a company, editor of an accredited standard in development, or an individual. It is provided for broad review (comments to the author are encouraged).

s = submitted The document is a proposal to the members for consideration to become an SFF Specification.

Spec #	Rev	List of Specifications as of January 28, 2004
SFF-8000		SFF Committee Information
INF-8001i	E	44-pin ATA (AT Attachment) Pinouts for SFF Drives
INF-8002i	E	68-pin ATA (AT Attachment) for SFF Drives
SFF-8003	E	SCSI Pinouts for SFF Drives
SFF-8004	E	Small Form Factor 2.5" Drives
SFF-8005	E	Small Form Factor 1.8" Drives
SFF-8006	E	Small Form Factor 1.3" Drives
SFF-8007	E	2mm Connector Alternatives
SFF-8008	E	68-pin Embedded Interface for SFF Drives
SFF-8009	4.1	Unitized Connector for Cabled Drives
SFF-8010	E	Small Form Factor 15mm 1.8" Drives
INF-8011i	E	ATA Timing Extensions for Local Bus
SFF-8012	3.0	4-Pin Power Connector Dimensions
SFF-8013	E	ATA Download Microcode Command
SFF-8014	C	Unitized Connector for Rack Mounted Drives
SFF-8015	E	SCA Connector for Rack Mounted SFF SCSI Drives
SFF-8016	C	Small Form Factor 10mm 2.5" Drives
SFF-8017	E	SCSI Wiring Rules for Mixed Cable Plants
SFF-8018	E	ATA Low Power Modes
SFF-8019	E	Identify Drive Data for ATA Disks up to 8 GB
INF-8020i	E	ATA Packet Interface for CD-ROMs
INF-8028i	E	- Errata to SFF-8020 Rev 2.5
SFF-8029	E	- Errata to SFF-8020 Rev 1.2
SFF-8030	1.8	SFF Committee Charter
SFF-8031		Named Representatives of SFF Committee Members
SFF-8032	1.5	SFF Committee Principles of Operation
INF-8033i	E	Improved ATA Timing Extensions to 16.6 MBs
INF-8034i	E	High Speed Local Bus ATA Line Termination Issues
INF-8035i	E	Self-Monitoring, Analysis & Reporting Technology
INF-8036i	E	ATA Signal Integrity Issues
INF-8037i	E	Intel Small PCI SIG
INF-8038i	E	Intel Bus Master IDE ATA Specification
INF-8039i	E	Phoenix EDD (Enhanced Disk Drive) Specification
SFF-8040	1.2	25-pin Asynchronous SCSI Pinout
SFF-8041	C	SCA-2 Connector Backend Configurations
SFF-8042	C	VHDCI Connector Backend Configurations

SFF-8043	E	40-pin MicroSCSI Pinout
SFF-8045	4.5	40-pin SCA-2 Connector w/Parallel Selection
SFF-8046	E	80-pin SCA-2 Connector for SCSI Disk Drives
SFF-8047	C	40-pin SCA-2 Connector w/Serial Selection
SFF-8048	C	80-pin SCA-2 Connector w/Parallel ESI
SFF-8049	E	80-conductor ATA Cable Assembly
INF-8050i	1.0	Bootable CD-ROM
INF-8051i	E	Small Form Factor 3" Drives
INF-8052i	E	ATA Interface for 3" Removable Devices
SFF-8053	5.5	GBIC (Gigabit Interface Converter)
SFF-8054	0.1	Automation Drive Interface Connector
INF-8055i	E	SMART Application Guide for ATA Interface
SFF-8056	C	50-pin 2mm Connector
SFF-8057	E	Unitized ATA 2-plus Connector
SFF-8058	E	Unitized ATA 3-in-1 Connector
SFF-8059	E	40-pin ATA Connector
SFF-8060	1.1	SFF Committee Patent Policy
SFF-8061	E	Emailing drawings over the SFF Reflector
SFF-8062		Rolling Calendar of SSWGs and Plenaries
SFF-8065	C	40-pin SCA-2 Connector w/High Voltage
SFF-8066	C	80-pin SCA-2 Connector w/High Voltage
SFF-8067	3.2	40-pin SCA-2 Connector w/Bidirectional ESI
INF-8068i	E	Guidelines to Import Drawings into SFF Specs
SFF-8069	E	Fax-Access Instructions
INF-8070i	1.3	ATAPI for Rewritable Removable Media
SFF-8072	1.2	80-pin SCA-2 for Fibre Channel Tape Applications
SFF-8073	C	20-pin SCA-2 for GBIC Applications
INF-8074i	1.0	SFP (Small Formfactor Pluggable) Transceiver
SFF-8075	1.0	PCI Card Version of SFP Cage
SFF-8076	-	SFP Additional IDs
INF-8077i	3.1	XFP (10 Gbs Small Form Factor Pluggable Module)
SFF-8078	C	XFP-E
SFF-8079	1.3	SFP Rate and Application Selection
SFF-8080	E	ATAPI for CD-Recordable Media
SFF-8082	3.1	Labeling of Ports and Cable Assemblies
SFF-8085	0.9	100 Mbs Small Formfactor Transceivers
SFF-8089	1.0	SFP Rate and Application Selection Values
INF-8090i	5.5	ATAPI for DVD (Digital Video Data)
SFF-8101	C	3 Gbs and 4 Gbs Signal Characteristics
SFF-8110	C	5V Parallel 1.8" drive form factor
SFF-8111	1.3	1.8" drive form factor (60x70mm)
SFF-8122		1.8" (60x70mm) w/SCA-2 Connector
SFF-8120	2.6	1.8" drive form factor (78x54mm)
SFF-8123	2.1	1.8" (60x70mm) w/Serial Attachment Connector
SFF-8200e	1.1	2 1/2" drive form factors (all of 82xx family)
SFF-8201	2.2	2 1/2" drive form factor dimensions
SFF-8212e	1.2	2 1/2" drive w/SFF-8001 44-pin ATA Connector
SFF-8221	3.4	Pre-Aligned 2.5" Drive >10mm Form Factor
SFF-8222	2.0	2.5" Drive w/SCA-2 Connector
SFF-8223	2.2	2.5" Drive w/Serial Attachment Connector
SFF-8225	C	2.5" Single Voltage Drive
SFF-8300	1.2	3 1/2" drive form factors (all of 83xx family)

SFF-8301	1.4	3 1/2" drive form factor dimensions
SFF-8302e	1.1	3 1/2" Cabled Connector locations
SFF-8323	1.2	3 1/2" drive w/Serial Attachment Connector
SFF-8332e	E	3 1/2" drive w/80-pin SFF-8015 SCA Connector
SFF-8337e	E	3 1/2" drive w/SCA-2 Connector
SFF-8342e	1.3	3 1/2" drive w/Serial Unitized Connector
INF-8350i	E	3 1/2" Packaged Drives
SFF-8400	C	VHDCI (Very High Density Cable Interconnect)
SFF-8410	16.1	High Speed Serial Testing for Copper Links
INF-8411	1.0	High Speed Serial Testing for Backplanes
SFF-8412	12.2	HSOI (High Speed Optical Interconnect) Testing
SFF-8415	4.1	HPEI (High Performance Electrical Interconnect)
SFF-8416	10.0	HPEI Bulk Cable Measurement/Performance Reqmnts
SFF-8420	11.1	HSSDC-1 Shielded Connections
SFF-8421	2.4	HSSDC-2 Shielded Connections
SFF-8422	C	FCI Shielded Connections
SFF-8423	C	Molex Shielded Connections
SFF-8424	0.5	Dual Row HSSDC-2 Shielded Connections
SFF-8425	1.4	Single Voltage 12V Drives
SFF-8426		HSSDC Double Width
SFF-8429		Signal Architecture for HSS Links
SFF-8430	4.1	MT-RJ Duplex Optical Connections
SFF-8441	14.1	VHDCI Shielded Configurations
SFF-8451	10.1	SCA-2 Unshielded Connections
SFF-8452	3.1	Glitch Free Mating Connections for Multidrop Aps
SFF-8453		Shielded High Speed Serial connectors
SFF-8460	1.2	HSS Backplane Design Guidelines
SFF-8464		Improved MM HSS Optical Link Performance
SFF-8470	2.9	Multi Lane Copper Connector
SFF-8471	C	ZFP Multi Lane Copper Connector
SFF-8472	9.4	Diagnostic Monitoring Interface for Optical Xcvrs
INF-8475i	2.2	XPAK Small Formfactor Pluggable Receiver
SFF-8480	2.1	HSS (High Speed Serial) DB9 Connections
SFF-8482	1.3	Internal Serial Attachment Connector
SFF-8483	C	External Serial Attachment Connector
SFF-8484	0.4	Multi Lane Internal Serial Attachment Connector
SFF-8485	0.3	Serial GPIO (General Purpose Input/Output) Bus
SFF-8500e	1.1	5 1/4" drive form factors (all of 85xx family)
SFF-8501e	1.1	5 1/4" drive form factor dimensions
SFF-8508e	1.1	5 1/4" ATAPI CD-ROM w/audio connectors
SFF-8523	1.2	5 1/4" drive w/Serial Attachment Connector
SFF-8551	3.2	5 1/4" CD Drives form factor
SFF-8552	0.5	5 1/4" Slimline Optical Drive Form Factor
SFF-8572	C	5 1/4" Tape form factor
SFF-8610	C	SDX (Storage Device Architecture)

2.3 Sources

Copies of SFF Specifications are available by joining the SFF Committee as an Observer or Member.

14426 Black Walnut Ct 408-867-6630x303
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CA 95070 FaxAccess: 408-741-1600

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Electronic copies of documents are also made available via CD_Access, a service which provides copies of all the specifications plus SFF reflector traffic. CDs are mailed every 2 months as part of the document service, and provide the letter ballot and paper copies of what was distributed at the meeting as well as the meeting minutes.

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Page numbers not accurate in this rev

3. Tables of Figures and Tables

3.1 TABLE OF FIGURES

3.2 TABLE OF TABLES

4. General Description

The HSSDC-2 Dual Row connection system is based on ribbon or leaf style contacts while other alternatives use round pins. This ribbon style offers single wipe and is based on proven connector technology using the mechanically robust ribbon or leaf contact style. It is very difficult to damage the contacts.

HSSDC-2 Dual Row connectors find their most important application where signals have rise times typically in the range of 250 ps and where positive retention is needed but ease of insertion and removal is also desired. This covers virtually all of the external inter-enclosure applications for gigabit serial applications that use balanced copper media for transmission.

The shield contact is required to make contact before any of the signal contacts upon insertion and to break contact only after all contacts are separated upon removal. This ensures that any ground potential differences between enclosures are first exposed to the shield and thereby minimizes the risk of damaging the sensitive input and output stages of the transceivers when the signal contacts are mated.

5. Definitions and Conventions

5.1 Definitions

For the purpose of SFF Specifications, the following definitions apply:

Advanced grounding contacts: Connector contacts that make first and break last and are capable of carrying power ground return currents and performing electrostatic discharge. Other terms sometimes used to describe these features are: grounding pins, ESD contacts, grounding contacts, static drain, and pre-grounding contacts.

Alignment guides: Connector features that preposition insulators prior to electrical contact. Other terms sometimes used to describe these features are: guide pins, guide posts, blind mating features, mating features, alignment features, and mating guides

Board Termination Technologies: surface mount single row, surface mount dual row, through hole, hybrid, straddle mount

Cable Termination: The attachment of wires to the termination side of a connector. Schemes commonly used in the industry are IDC (Insulation Displacement Contact), IDT (Insulation Displacement Termination), wire slots, solder, weld, crimp, braise, etc.

Contact mating sequence: Order of electrical contact during mating/unmating process. Other terms sometimes used to describe this feature are: contact sequencing, contact positioning, make first/break last, EMLB (early make late break) staggered contacts, and long pin / short pin.

Fixed: Used to describe the gender of the mating side of the connector that accepts its mate upon mating. This gender is frequently, but not always, associated with the common terminology “receptacle”. Other terms commonly used are “female” and “socket connector”. The term “fixed” is adopted from EIA standard terminology as the gender that most commonly exists on the fixed end of a connection, for example, on the board or bulkhead side. In this document “fixed” is specifically used to describe the mating side gender illustrated in Figure 1.

Free: Used to describe the gender of the mating side of the connector that penetrates its mate upon mating. This gender is frequently, but not always, associated with the common terminology “plug”. Other terms commonly used are “male” and “pin connector”. The term “free” is adopted from EIA standard terminology as the gender that most commonly exists on the free end of a connection, for example, on the cable side. In this document “free” is specifically used to describe the mating side gender illustrated in Figure 1.

Frontshell: That metallic part of a connector body that directly contacts the backshell or other shielding material that provides mechanical and shielding continuity between the connector and the cable media. Other terms sometimes used to describe this part of a cable assembly are: housing, nosepiece, cowling, and metal shroud.

Free Board: A connector that uses a free gender mating side and a termination side suitable for any of the printed circuit board termination technologies

Fixed Board: : A connector that uses a fixed gender mating side and a termination side suitable for any of the printed circuit board termination technologies

Height: Distance from board surface to farthest overall connector feature

Mating side: The side of the connector that joins and separates from the mating side of a connector of opposite gender. Other terms commonly used in the industry are mating interface, separable interface and mating face.

Offset: An alignment shift from the center line of the connector

Optional: This term describes features which are not required by the SFF Specification. However, if any feature defined by the SFF Specification is implemented, it shall be done in the same way as defined by the Specification. Describing a feature as optional in the text is done to assist the reader. If there is a conflict between text and tables on a feature described as optional, the table shall be accepted as being correct.

Reserved: Where this term is used for defining the signal on a connector pin its actual function is set aside for future standardization. It is not available for vendor specific use. Where this term is used for bits, bytes, fields and code values; the bits, bytes, fields and code values are set aside for future standardization. The default value shall be zero. The originator is required to define a Reserved field or bit as zero, but the receiver should not check Reserved fields or bits for zero.

Right Angle: A connector design for use with printed circuit board assembly technology where the mating direction is parallel to the plane of the printed circuit board

Single row: A connector design for use with surface mount printed circuit board assembly technology where the termination side points are arranged in one line

Single sided termination: A cable termination assembly style and a connector design style where only one side of the connector is accessible when attaching wires. This style frequently has IDC termination points that point in the same direction.

Straddle mount: A connector design style and a printed circuit board design style that uses surface mount termination points on both sides of the board. The connector is frequently centered between the top and bottom surfaces of the board.

Straight: A connector design for use with printed circuit board assembly technology where the mating direction is perpendicular to the plane of the printed circuit board

Surface mount: A connector design and a printed circuit board design style where the connector termination points do not penetrate the printed circuit board and are subsequently soldered to the printed circuit board

Termination side: The side of the connector opposite the mating side that is used for permanently attaching conductors to the connector. Due to pin numbering differences between mating side genders the termination side shall always be specified in conjunction with a mating side of a specific gender. Other terms commonly used in the industry are: back end, non-mating side, footprint, pc board side, and post side

Through hole: A connector design and a printed circuit board design style where the connector termination points penetrates the printed circuit board and are subsequently soldered to the printed circuit board.

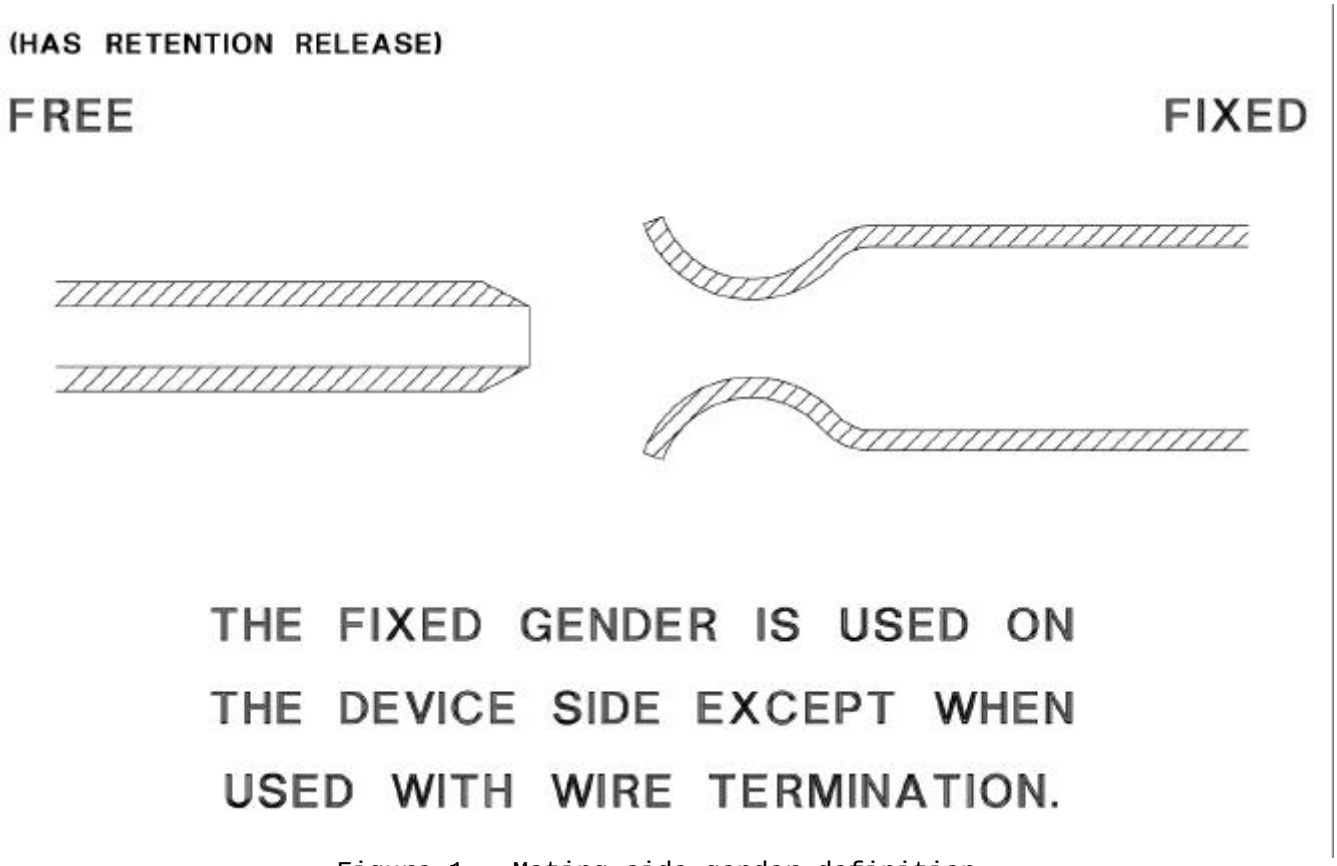

Figure 1 – Mating side gender definition

5.2 Conventions

The American convention of numbering is used i.e., the thousands and higher multiples are separated by a comma and a period is used as the decimal point. This is equivalent to the ISO convention of a space and comma.

American:	ISO:
0.6	0,6
1,000	1 000
1,323,462.9	1 323 462,9

6. Connector descriptions:

6.1 Complete connector options

The complete connectors listed in this section are supported in this document. The overall view of the mating sides are shown in Figure 3.

FREE MATING SIDE CONNECTORS (used on the side that has the retention release) Refer to figures (5) and (6) for mating side specifications.

CONNECTOR NAME	OVERVIEW	OUTLINE	TERMINATION SIDE
Free Cable	Figure 3	Figure 5	NA

FIXED MATING SIDE CONNECTORS (used on the device side except when used with cable terminations) Refer to figures (4) and (7) for mating side specifications.

CONNECTOR NAME	OVERVIEW	OUTLINE	TERMINATION SIDE
Fixed Board Right Angle Surface Mount	Figure 3	Figure 4	Figure 8

Only the physical dimensions and a table of the most important performance requirements are listed below.

6.2 Performance and compatibility requirements

6.2.1 Low frequency performance requirements

HSSDC-2 shielded connectors shall meet the performance requirements specified in table (2). These requirements are all for the connector proper and do not include the high speed requirements that ensure adequate operation at gigabit/s and above rates.

Table 1 – Connector ratings

Items	Specifications
1) Current	0.5 ampere maximum
2) Voltage	30 volts DC
3) Temperature	-10 to 60°C

Table 2 – Low frequency performance requirements for HSSDC-2 connectors

Parameter	Requirements
Insulation Resistance	1000 Megohms minimum
Dielectric withstanding voltage	350 VAC at sea level. 1 minute hold with no breakdown or flashover
Contact Resistance Non-Shield Contacts	70 milliohms maximum initial; 20 milliohms maximum change

Table 3 – Mechanical Requirements

Items	Conditions	Specifications
1) Durability	Mating speed: 500 cycles per hour maximum	250 cycles
2) Insertion Force	Measurement speed: 12.7mm per minute maximum	See Table 4
3) Withdrawal Force	Measurement speed: 12.7mm per minute maximum with retention latch disengaged	See Table 4
4) Durability	Mating speed should be 500 cycles per hour maximum	250 cycles
5) Vibration, random	EIA-364-28, Test Condition VII, Condition D.	Subject mated specimens to 3.10 G’s rms between 20-500 Hz for 15 minutes in each of 3 mutually perpendicular planes

Table 4 – Insertion and Withdrawal Force

Items	
Insertion Force (N Maximum)	50
Withdrawal Force (N Maximum)	50

Table 5 – Environmental Requirements

Test Items	Test Conditions	Specifications
1) Vibration, random	EIA-364-28, Test Condition VII, Condition D.	Subject mated specimens to 3.10 G's rms between 20-500 Hz for 15 minutes in each of 3 mutually perpendicular planes
2) Physical shock	EIA-364-27, Method H.	Subject mated specimens to 30 G's half-sine shock pulses of 11 milliseconds duration. 3 shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks.
3) Thermal shock	EIA-364-32	Subject unmated specimens to 5 cycles between –10 and 70°C
4) Temperature Life	EIA-364-17, Method A, Test Condition 2, Test Time Condition C	Subject mated specimens to 70°C for 500 hours
5) Humidity-temperature cycling	EIA-364-31 Method III.	Subject unmated specimens to 10 cycles (10 days) between 25 and 65°C at 80 to 100% RH
6) Mixed flowing gas	EIA-364-65, Class IIA	Subject specimens to environmental Class IIA for 7 days unmated, and 7 days mated.

6.2.2 Connector performance (After test)

The connector should satisfy the minimum performance indicated in Table 6

Note – On Table 6, items with a "Y" should be measured/observed. Items with "N" should not be required measurement or observation.

Table 6 – Connector performance (After test)

Items	Insertion withdrawal force	Contact resistance	Insulation resistance	Dielectric withstanding voltage	Appearance check
Condition	Satisfy Table 4	Resistance change should be 20 milli-ohms maximum	1000 Megohms minimum	Satisfy Table 2	There should be no defect
Durability	Y	Y	N	N	Y
Vibration	Y	Y	N	N	Y
Physical shock	Y	Y	N	N	Y
Thermal shock	N	N	Y	Y	Y
Temperature Life	N	Y	N	N	Y
Humidity-temperature cycling	N	N	Y	Y	Y
Mixed flowing gas	N	Y	N	N	y

6.2.3 High frequency performance requirements

The requirements for the high speed performance are enabled by reference to SFF-8410, a separate SFF document that defines testing methodology and some performance requirements. These high speed performance requirements are incorporated into the HSSDC-2 specification by reference and constitute an essential part of the HSSDC-2 specification. For convenience these requirements are not duplicated here.

6.2.4 PCB compatibility requirements

The physical compatibility requirements for use with printed circuit boards are given in table (7). Board thickness' and/or assembly processes that require tail lengths other than that given in table (7) are not compatible with the connectors defined in this document.

Table 7 – Printed circuit board compatibility requirements

Termination Side Style	Printed Circuit Board Thickness	
	MIN (MM / INCHES)	MAX (MM / INCHES)
Fixed Board Right Angle Surface Mount*	1.57 / 0.062	2.36 / 0.093
* This dimension necessary to accommodate board retention feature that penetrates the board.		

6.3 Dimensional requirements

The drawings in this section use the dimensioning conventions described in ANSI-Y14.5M, Dimensioning and tolerancing. All dimensions are in millimeters.

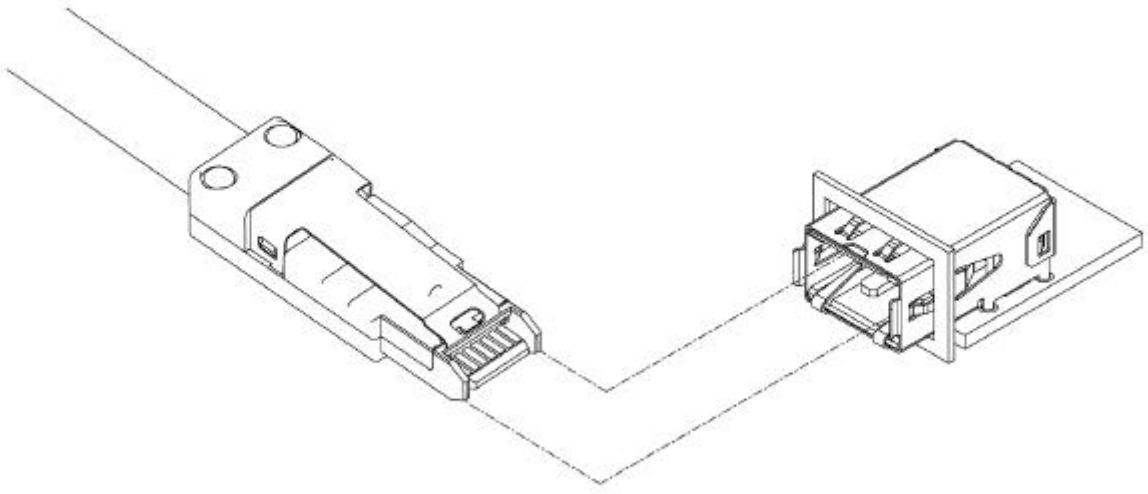

Figure 2 – General view of mating sides

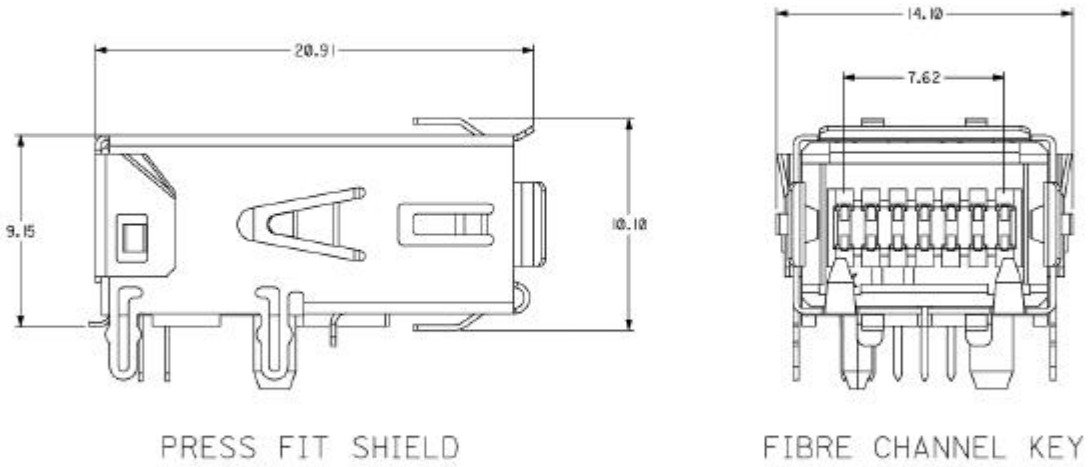

Figure 3 – Fixed board right angle surface mount outline dimensions

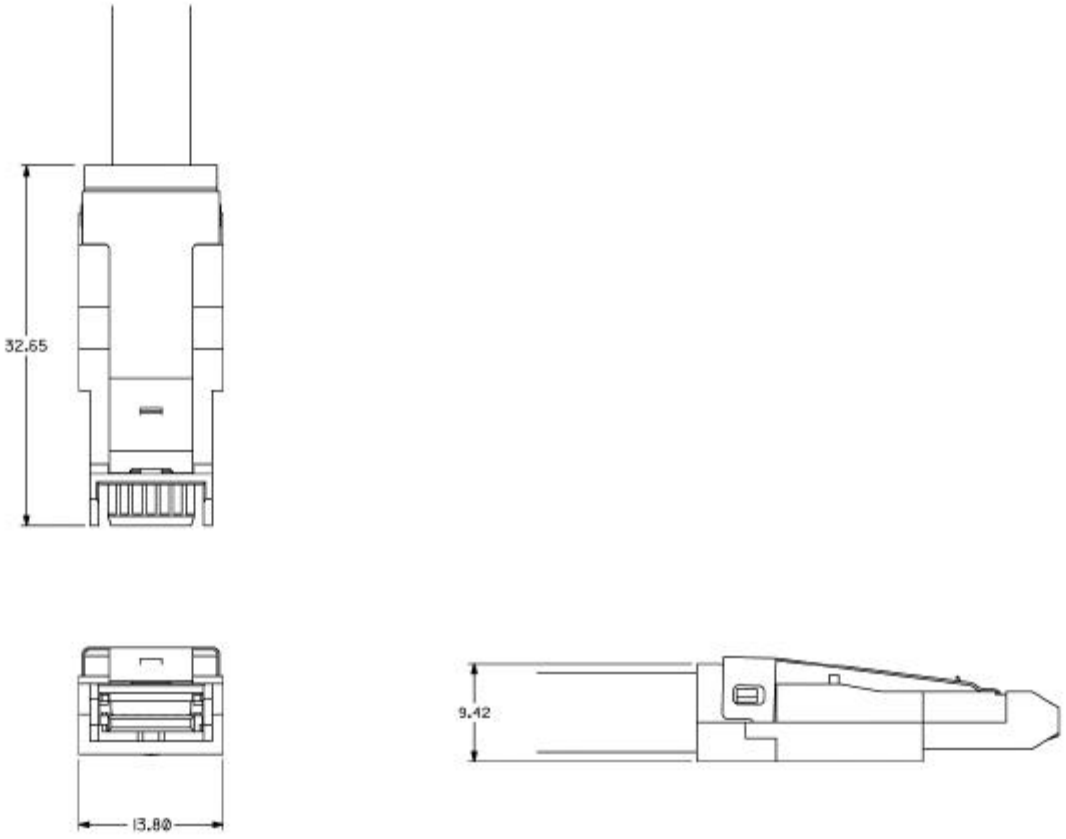

Figure 4 – Free cable outline dimensions

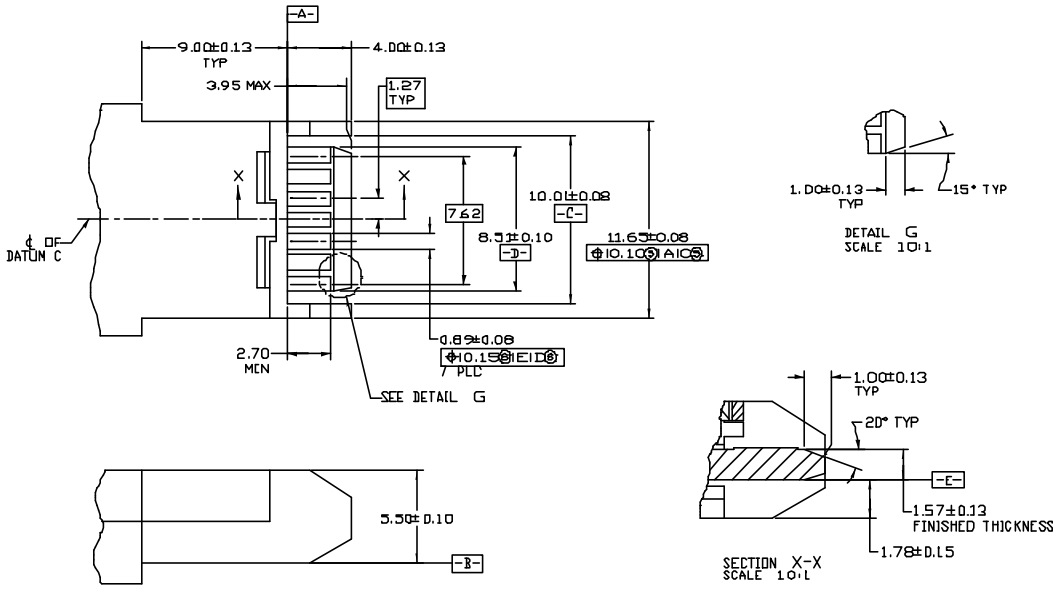

Figure 5 – Free cable mating dimensions

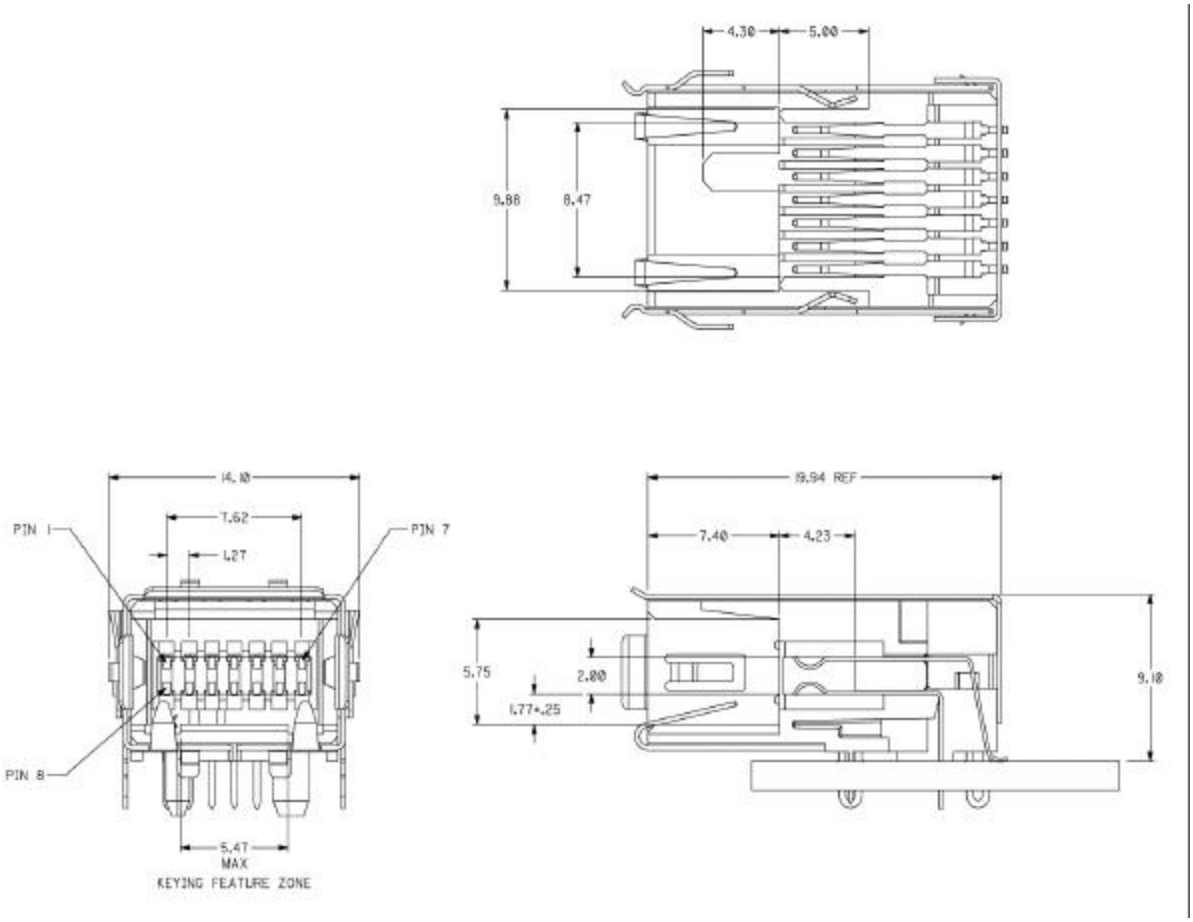

Figure 6 - Fixed mating side dimensions

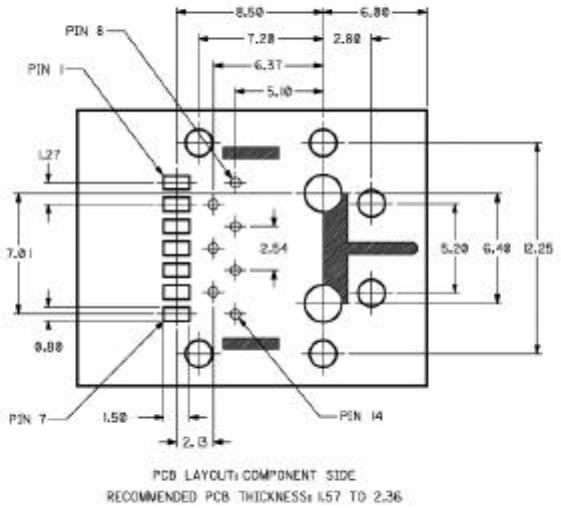

Figure 7 – Fixed board right angle pin-thru-hole/surface mount footprint

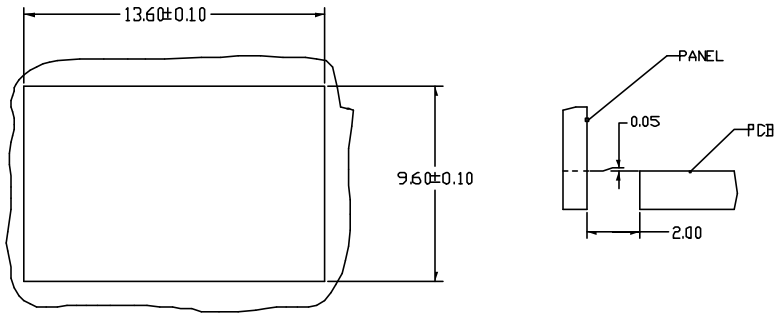

Figure 8 – Bulkhead cutout fixed right angle surface mount

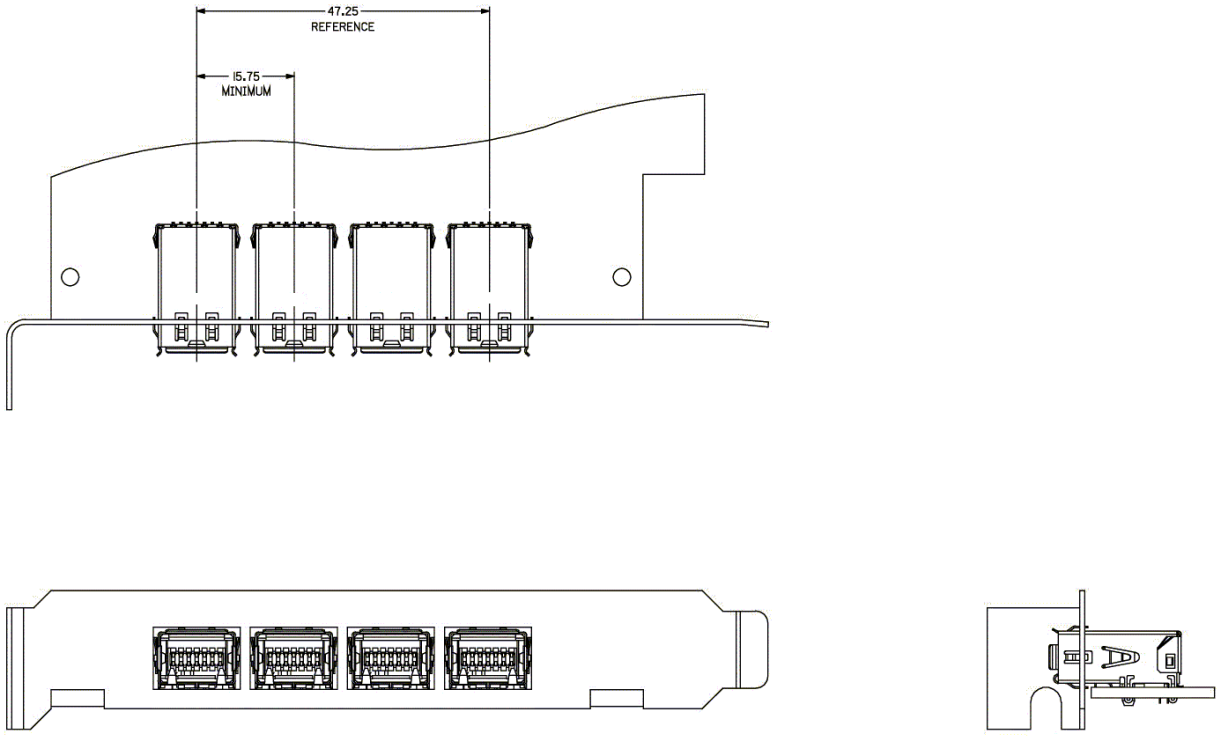

Figure 9– PCI bracket 4 bay dimensions fixed board right angle surface mount

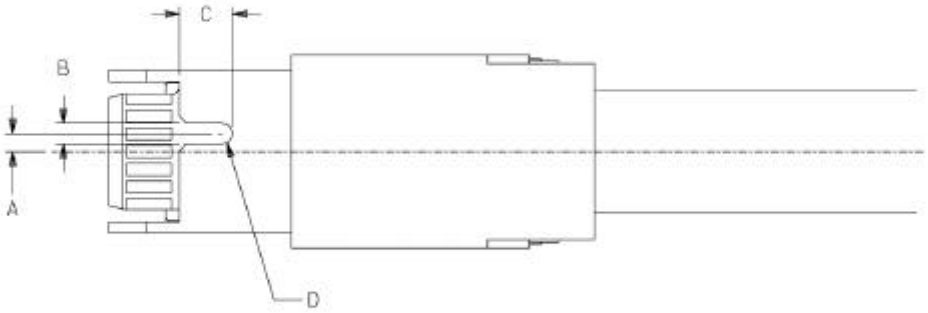

FIGURE 10 – KEYING OPTIONS

Description	"A"	"B"	"C"	"D" (radius)
150 Ohms (Left Offset)	1.51±0.13	2.25±0.13	3.80±0.13	1.13±0.13
100 Ohms (Center Offset)	0.00±0.13	1.25±0.13	3.80±0.13	0.63±0.13